MANUFACTURE OF PRINTED WIRING BOARD

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Inventor: KIMURA TOSHIYA
Applicant: NEC TOYAMA LTD
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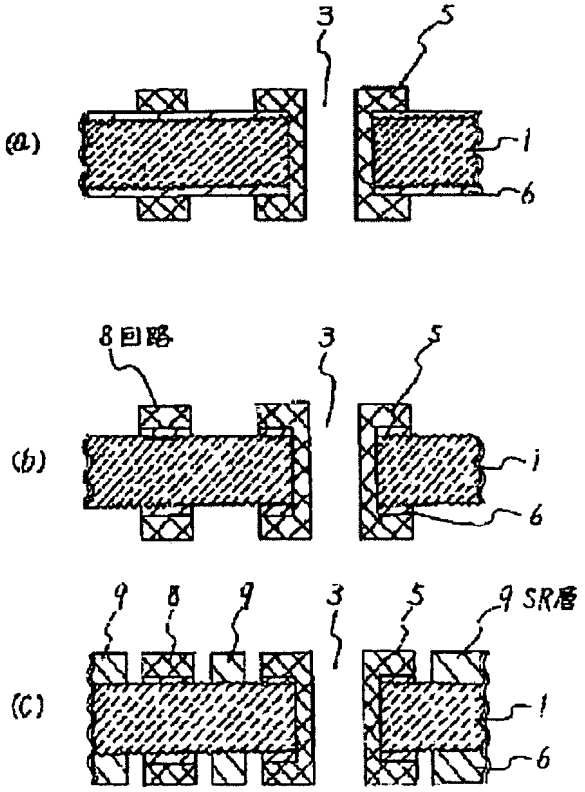
Abstract of **JP6021648**

PURPOSE:To provide a high density printed wiring board having good insulation characteristics and good adhesion between an SR layer and a resin board by using an additive method requiring no bonding agent layer. CONSTITUTION:An organic coating film is precipitated on a copper foil 6, and an evenly-roughened surface is obtained by chemical copper and electric copper plating. Then the roughened surface and a resin board 1 are laminated together, and after hole opening and catalyst application, the thin copper foil 6 is obtained through etching. A plating resist layer is formed, and the chemical copper plating 5 and the plating resist layer are removed, and further by soft etching, the thin copper foil 6 is removed, for obtaining an evenly roughened surface of the resin board 1. Then an SR layer 9 is formed, thus a printing wiring, board is manufactured through an additive method.



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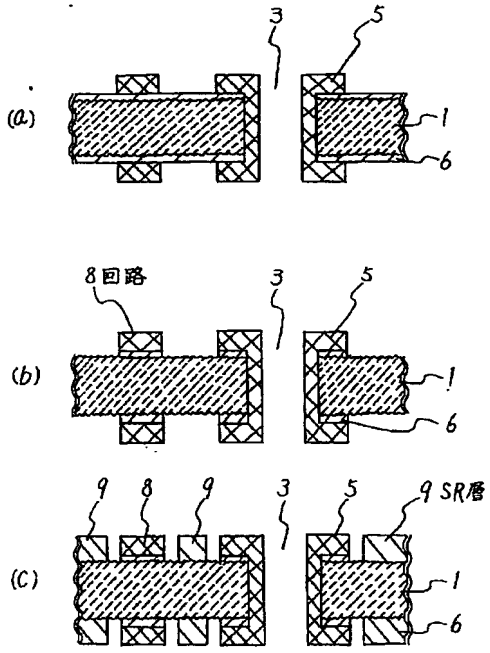
(71)出願人　000236931
富山日本電気株式会社
富山県下新川郡入善町入膳560

(72)発明者　木村　俊哉
富山県下新川郡入善町入膳560番地富山日本電気株式会社内

(74)代理人　弁理士　京本　直樹　(外２名)

(54)【発明の名称】　印刷配線板の製造方法

(57)【要約】
【目的】接着剤層の不要なアディティブ法により、絶縁特性に優れ、且つ、ＳＲ層と樹脂基板の密着力の高い、高密度印刷配線板を得る。
【構成】銅箔６に有機皮膜を析出させ、化学銅めっき，電気銅めっきにより均一な粗化面を得た後、この粗化面と樹脂基板１を合わせて積層し、穴あけ，触媒付与後、エッチングにより薄い銅箔６にする。そして、めっきレジスト層形成、化学銅めっき、めっきレジスト層除去を行い、ソフトエッチングにより薄い銅箔６を除去することにより、均一に粗化された樹脂基板１表面を得る。その後、ＳＲ層９を形成することによりアディティブ法による印刷配線板を製造する。



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【特許請求の範囲】

【請求項１】　不溶性アノードを陽極，銅箔を陰極として、界面活性剤，有機物，アルカリの混合液を電解液として用い、一定の電流密度で電解し有機皮膜を形成させ、その後化学銅めっき，電気銅めっきにより均一に粗化した前記銅箔を得る工程と、該銅箔と樹脂基板とを積層する工程と、穴あけ後触媒を付与する工程と、前記銅箔をエッチングで薄くする工程と、該銅箔上にめっきレジストを形成する工程と、化学銅めっきによりスルーホールと回路を形成する工程と、前記めっきレジストを剥離する工程と、ソフトエッチングにより前記めっきレジスト下にあった前記銅箔を除去した後ＳＲ層を印刷する工程とを有することを特徴とするアディティブ法による印刷配線板の製造方法。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は印刷配線板の製造方法に関し、特にアディティブ法のスルーホール印刷配線板の製造方法に関する。

【０００２】

【従来の技術】従来、アディティブ法でスルーホール印刷配線板を製造するには、まず、図５（ａ）に示すように、樹脂基板１を形成する。次に、図５（ｂ）に示すように、接着剤をラミネートしてそれを紫外線で硬化し接着剤層２を形成する。次に、図５（ｃ）に示すように、所定の位置に貫通孔３ａをあけ、図５（ｄ）に示すように、接着剤層２の表面をクロム酸－硫酸混合液で粗化した後、触媒活性化する。次に、図５（ｅ）に示すように、めっきレジストを印刷し熱硬化してめっきレジスト層４を形成する。次に、図６に示すように、化学銅めっきで所定のめっき厚の化学銅めっき層５とスルーホール３を形成し、アディティブ法によるスルーホール印刷配線板を得ていた。尚、接着剤層２については、液状接着剤をコーティングし熱硬化する方法も使用されていた。また、接着剤層２の粗化では、過マンガン酸塩等も用いることができる。その他，めっきレジスト層４の形成では、めっきレジストフィルムをラミネートし、所定のマスクフィルムを当接して紫外線にて露光後，未露光部分を現像除去し、次に化学銅めっきで所定のめっき厚の化学銅めっき層５を形成する方法も行われていた。

【０００３】

【発明が解決しようとする課題】従来のアディティブ法によるスルーホール印刷配線板の製造方法では、貫通孔３ａを穴あけした後、接着剤層２の粗化及び触媒活性化処理し、その上にめっきレジスト層４を形成するため、めっきレジスト層４の下に触媒が残存し、その残存する触媒の影響により、図７に示すように、回路間の絶縁抵抗が劣化しやすいという問題点があった。

【０００４】また、耐化学銅めっき性を有するめっきレジスト層４が細線対応力が不充分であり、高密度化が難

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しいという問題点があった。

【０００５】本発明の目的は、回路間の絶縁抵抗の劣化がなく、高密度化が容易な印刷配線板の製造方法を提供することにある。

【０００６】

【課題を解決するための手段】本発明の印刷配線板の製造方法は、不溶性アノードを陽極，銅箔を陰極として、界面活性剤，有機物，アルカリの混合液を電解液として用い、一定の電流密度で電解し有機皮膜を形成させ、その後化学銅めっき，電気銅めっきにより均一に粗化した前記銅箔を得る工程と、該銅箔と樹脂基板とを積層する工程と、穴あけ後触媒を付与する工程と、前記銅箔をエッチングで薄くする工程と、該銅箔上にめっきレジストを形成する工程と、化学銅めっきによりスルーホールと回路を形成する工程と、前記めっきレジストを剥離する工程と、ソフトエッチングにより前記めっきレジスト下にあった前記銅箔を除去した後ＳＲ層を印刷する工程とを有する。

【０００７】

【実施例】次に、本発明の実施例について図面を参照して説明する。

【０００８】図１（ａ）～図３（ｃ）は本発明の一実施例を説明する工程順に示した断面図である。

【０００９】まず、図（ａ）に示すように銅箔６を形成する。銅箔６の厚みとしては５～４００μｍが使用される。

【００１０】次に、図１（ｂ）に示すように、不溶性アノード７を陽極，銅箔６を陰極として、カチオン系界面活性剤０．０１～２％，カルボキシル系有機物０．０１～５％，水酸化ナトリウム０．１～４ｇ／ｌの液で、Ｄ．Ｃ．０．０１～１０Ｖ，電流密度０．００１～１０Ａ／ｄｍ²，０．１～３０分間電解し有機皮膜を形成させる。不溶性アノード材としては、ステンレスやチタン白金等が使用できる。その後、水洗し、化学銅めっき，電気銅めっきを行うことにより、図１（ｃ）に示すように１～１０μｍの均一な表面粗さを有する銅箔６の表面を得る。

【００１１】次に、図１（ｄ）に示すように、図１（ｃ）の工程で得た銅箔６を樹脂基板１の両面に当接させ，図１（ｅ）に示すように、加熱，加圧により積層する。その後、図２（ａ）に示すように、所定の位置に貫通孔３ａを穴あけした後、触媒活性化する。

【００１２】次に、図２（ｂ）に示すように、厚みが０．５～５μｍ残るように銅箔６をエッチングする。エッチング液としては、塩化第２銅溶液，塩化鉄液，硫酸－過酸化水素液等が使用できる。その後、図２（ｃ）に示すように、所定のめっきレジスト層４をスクリーン印刷により形成し、熱硬化する。

【００１３】次に、図２（ｄ）に示すように、化学銅めっきを所定のめっき厚になるよう行い、スルーホール

3，化学銅めっき層5を形成する。

【0014】次に、図3（a）に示すように、めっきレジスト層4を剥離し、図3（b）に示すように、ソフトエッチングにより銅箔6をエッチングし均一に粗化された樹脂基板1の表面を得た後、図3（c）に示すように、所定のスクリーンによりSR層9を形成する。

【0015】図4は本発明の一実施例による印刷配線板の耐電食性を示す特性図である。

【0016】このようにして得られた印刷配線板は、SR層9の下に触媒の残渣がないので、図4に示すように、回路間の絶縁抵抗の劣化は認められなかった。

【0017】尚、図2（c）のめっきレジスト層4の形成では、めっきレジストフィルムをラミネートし、所定のマスクフィルムを当接して紫外線にて露光後、未露光部分を現像除去し、次に、化学銅めっきする方法も使用できる。

【0018】また、図3（c）のSR層9の形成では、カーテンコーター，スプレィコーター，静電塗装，ロールコーターなどによりSRインクを塗布したり、または、ドライフィルムをラミネートした後、所定のマスクフィルムを当接して露光し、未露光部分を現像液で除去する方法も使用できる。

【0019】

【発明の効果】以上説明したように本発明では、SR層の下に触媒の残渣がないので、絶縁抵抗劣化を防止できる効果がある。

【0020】また、均一に粗化された樹脂基板面上にSR層を形成するため、細線密着力に優れており、高密度＊

＊対応が可能となる効果がある。

【図面の簡単な説明】

【図1】本発明の一実施例を説明する工程順に示した断面図である。

【図2】本発明の一実施例を説明する工程順に示した断面図である。

【図3】本発明の一実施例を説明する工程順に示した断面図である。

【図4】本発明の一実施例による印刷配線板の耐電食性を示す特性図である。

【図5】従来の印刷配線板の製造方法の一例を説明する工程順に示した断面図である。

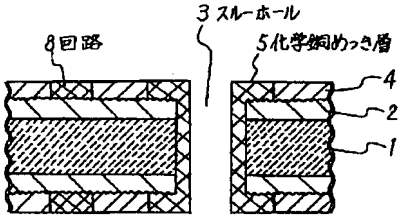
【図6】従来の印刷配線板の製造方法の一例を説明する工程順に示した断面図である。

【図7】従来の印刷配線板の製造方法の一例による印刷配線板の耐電食性を示す特性図である。

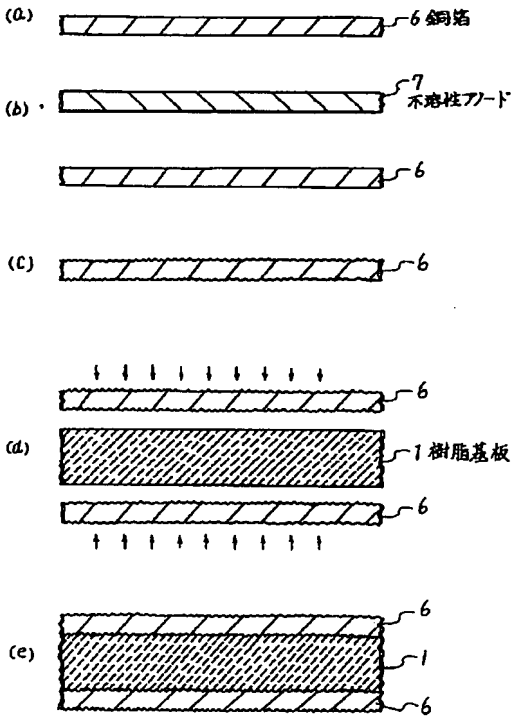
【符号の説明】

1　樹脂基板
2　接着剤層
3　スルーホール
3a　貫通孔
4　めっきレジスト層
5　化学銅めっき層
6　銅箔
7　不溶性アノード
8　回路
9　SR層

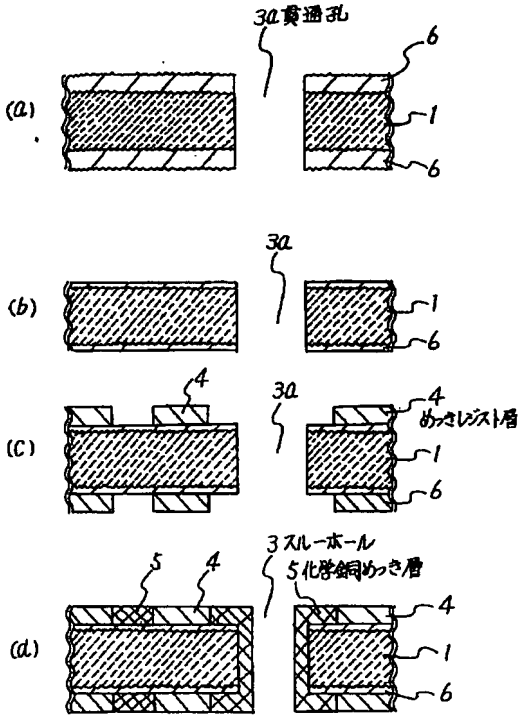
【図6】



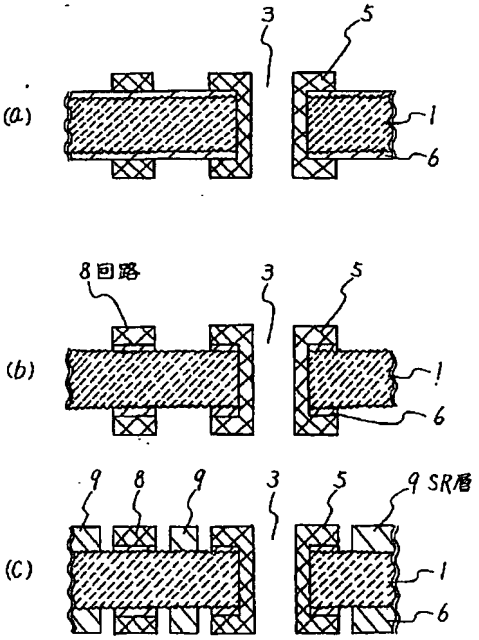
【図1】


(a)
6 銅箔
(b)
7 不導性フード
6
(c)
6
(d)
6
1 樹脂基板
6
(e)
6
1
6

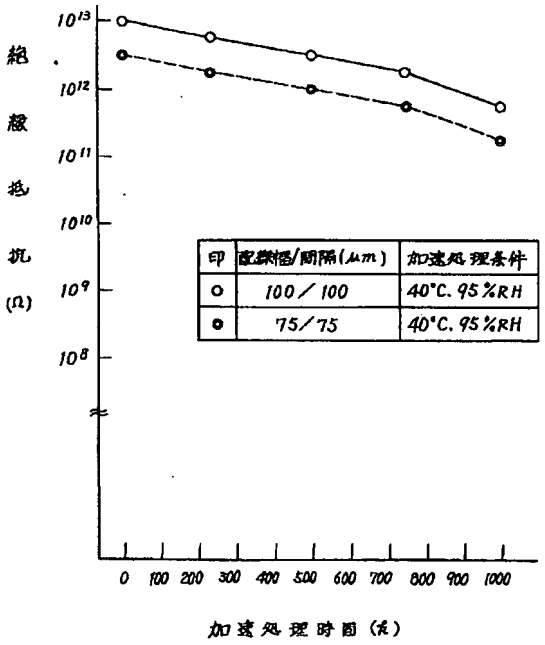
【図2】


3a 貫通孔
(a)
6
1
6
(b)
3a
1
6
(c)
4
3a
4 めっきレジスト層
1
6
(d)
3 スルーホール
5 化学銅めっき層
5
4
4
1
6

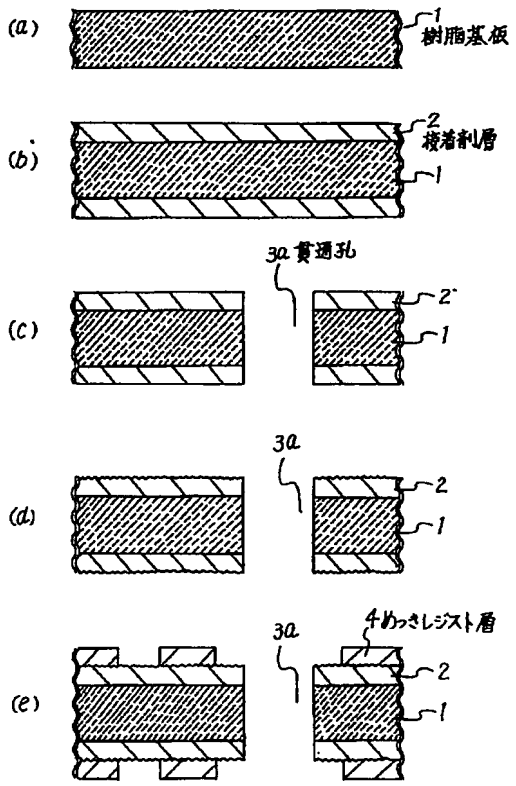
【図3】


(a)
3
5
1
6
(b)
8 回路
3
5
1
6
(c)
9
8
9
3
5
9 SR層
1
6

【図4】

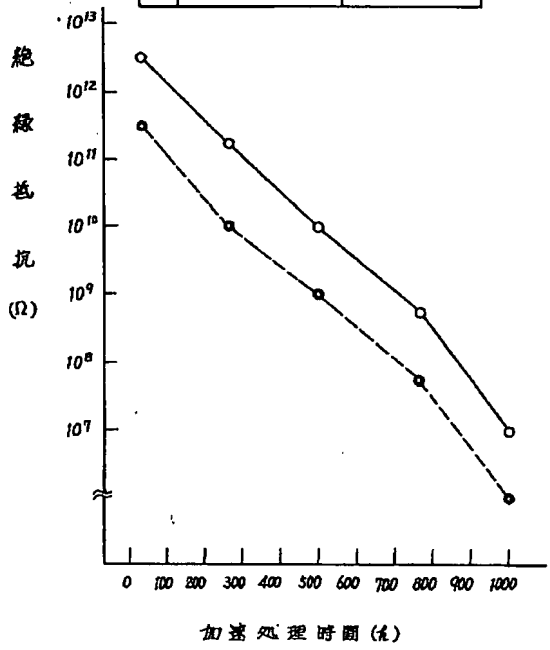

絶縁抵抗 (Ω)
10^13
10^12
10^11
10^10
10^9
10^8
印 | 配線幅/間隔(μm) | 加速処理条件
○ | 100／100 | 40°C. 95%RH
● | 75／75 | 40°C. 95%RH
0 100 200 300 400 500 600 700 800 900 1000
加速処理時間 (h)

【図5】



【図7】

印	直線幅/間隔(μm)	加速処理条件
○	100／100	40°C、95%RH
●	75／75	40°C、95%RH



PATENT ABSTRACTS OF JAPAN

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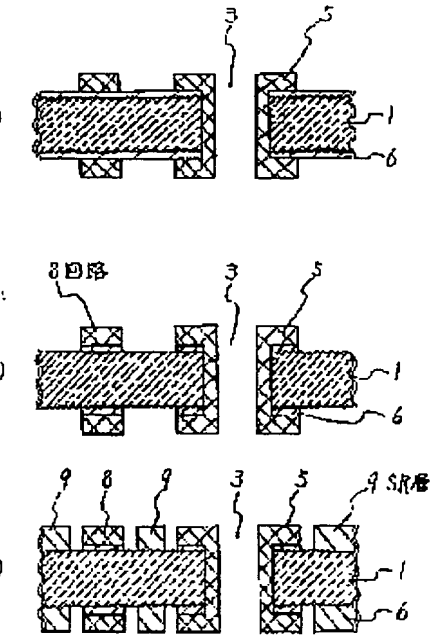
H05K 3/24

(21)Application number : 04-176343
(22)Date of filing : 03.07.1992

(71)Applicant : NEC TOYAMA LTD
(72)Inventor : KIMURA TOSHIYA

(54) MANUFACTURE OF PRINTED WIRING BOARD

(57)Abstract:
PURPOSE: To provide a high density printed wiring board having good insulation characteristics and good adhesion between an SR layer and a resin board by using an additive method requiring no bonding agent layer.
CONSTITUTION: An organic coating film is precipitated on a copper foil 6, and an evenly-roughened surface is obtained by chemical copper and electric copper plating. Then the roughened surface and a resin board 1 are laminated together, and after hole opening and catalyst application, the thin copper foil 6 is obtained through etching. A plating resist layer is formed, and the chemical copper plating 5 and the plating resist layer are removed, and further by soft etching, the thin copper foil 6 is removed, for obtaining an evenly roughened surface of the resin board 1. Then an SR layer 9 is formed, thus a printing wiring, board is manufactured through an additive method.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The mixed liquor of a surfactant, the organic substance, and alkali is used as the electrolytic solution by using copper foil as cathode, using an insoluble anode as an anode plate. The process which obtains said copper foil which electrolyzed with fixed current density, was made to form an organic coat, and was roughened to homogeneity with chemistry copper plating and electrolytic copper plating after that, The process which carries out the laminating of this copper foil and the resin substrate, and the process which gives the catalyst after drilling, The process which makes said copper foil thin by etching, and the process which forms plating resist on this copper foil, The process which forms a through hole and a circuit by chemistry copper plating, and the process which exfoliates said plating resist, The manufacture approach of the printed circuit board by the additive process characterized by having the process which prints SR layer after removing said copper foil which suited under said plating resist by software etching.

[Translation done.]

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3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] Especially this invention relates to the manufacture approach of the through hole printed circuit board of an additive process about the manufacture approach of a printed circuit board.
[0002]
[Description of the Prior Art] In order to manufacture a through hole printed circuit board with an additive process conventionally, as shown in drawing 5 (a), the resin substrate 1 is formed first. Next, as shown in drawing 5 (b), adhesives are laminated, it is hardened by ultraviolet rays, and the adhesives layer 2 is formed. Next, it ********-izes, after roughening the front face of the adhesives layer 2 with chromic-acid-sulfuric-acid mixed liquor as are shown in drawing 5 (c), and breakthrough 3a is opened in a position and it is shown in drawing 5 (d). Next, as shown in drawing 5 (e), plating resist is printed, it heat-hardens and the plating-resist layer 4 is formed. Next, as shown in drawing 6 , the chemistry copper-plating layer 5 and through hole 3 of plating thickness predetermined by chemistry copper plating were formed, and the through hole printed circuit board by the additive process had been obtained. In addition, about the adhesives layer 2, the approach of coating liquid glue and heat-hardening was also used. Moreover, a permanganate etc. can be used in roughening of the adhesives layer 2. In addition, in formation of the plating-resist layer 4, the plating-resist film was laminated, the predetermined mask film was contacted, development clearance of the part for an unexposed part was carried out after exposure in ultraviolet rays, and the approach of forming the chemistry copper-plating layer 5 of plating thickness predetermined by chemistry copper plating next was also performed.
[0003]
[Problem(s) to be Solved by the Invention] By the manufacture approach of the through hole printed circuit board by the conventional additive process, after punching breakthrough 3a, in order for the adhesives layer 2 to catalytic-activity--ization[roughening and]-process and to form the plating-resist layer 4 on it, the catalyst remained under the plating-resist layer 4, and there was a trouble that the insulation resistance between circuits tends to deteriorate under the effect of the catalyst which remains as shown in drawing 7 .
[0004] Moreover, the force corresponding to a thin line has the inadequate plating-resist layer 4 which has chemistry-proof copper-plating nature, and there was a trouble that densification was difficult.
[0005] The object of this invention does not have degradation of the insulation resistance between circuits, and densification is to offer the manufacture approach of an easy printed circuit board.
[0006]
[Means for Solving the Problem] The manufacture approach of the printed circuit board of this invention uses an insoluble anode an anode plate, and uses copper foil as cathode. The process which obtains said copper foil which electrolyzed with fixed current density, was made to form an organic coat, using the mixed liquor of a surfactant, the organic substance, and alkali as the electrolytic solution, and was roughened to homogeneity with chemistry copper plating and

electrolytic copper plating after that, The process which carries out the laminating of this copper foil and the resin substrate, and the process which gives the catalyst after drilling, The process which makes said copper foil thin by etching, and the process which forms plating resist on this copper foil, It has the process which forms a through hole and a circuit by chemistry copper plating, the process which exfoliates said plating resist, and the process which prints SR layer after removing said copper foil which suited under said plating resist by software etching.
[0007]
[Example] Next, the example of this invention is explained with reference to a drawing.
[0008] Drawing 1 (a) - drawing 3 (c) are the sectional views shown in order of the process explaining one example of this invention.
[0009] First, as shown in drawing (a), copper foil 6 is formed. 5-400 micrometers is used as thickness of copper foil 6.
[0010] next, it is shown in drawing 1 (b) -- as --- an insoluble anode 7 -- an anode plate and copper foil 6 -- cathode -- carrying out -- the liquid of 0.01 - 2% of cation system surface active agents, 0.01 - 5% of carboxyl system organic substance, a sodium hydroxide 0.1 - 4 g/l -- D.C. 0.01-10V, current density 0.001 - 10 A/dm2 --- it electrolyzes for 0.1 - 30 minutes, and an organic coat is made to form Stainless steel, titanium white gold, etc. can be used as insoluble anode material. Then, the front face of the copper foil 6 which has 1-10-micrometer uniform surface roughness as shown in drawing 1 (c) is obtained by rinsing and performing chemistry copper plating and electrolytic copper plating.
[0011] Next, as shown in drawing 1 (d), the copper foil 6 obtained at the process of drawing 1 (c) is made to contact both sides of the resin substrate 1, and as shown in drawing 1 (e), a laminating is carried out by heating and application of pressure. Then, it ********-izes, after punching breakthrough 3a to a position, as shown in drawing 2 (a).
[0012] Next, as shown in drawing 2 (b), copper foil 6 is etched so that 0.5-5 micrometers of thickness may remain. As an etching reagent, a cupric chloride solution, ferric chloride liquid, sulfuric-acid-hydrogen-peroxide liquid, etc. can be used. Then, as shown in drawing 2 (c), the predetermined plating-resist layer 4 is formed by screen-stencil, and it heat-hardens.
[0013] Next, as shown in drawing 2 (d), chemistry copper plating is performed so that it may become predetermined plating thickness, and a through hole 3 and the chemistry copper-plating layer 5 are formed.
[0014] Next, after obtaining the front face of the resin substrate 1 which etched copper foil 6 by software etching, and was roughened by homogeneity as are shown in drawing 3 (a), and it exfoliates and the plating-resist layer 4 is shown in drawing 3 (b), as shown in drawing 3 (c), the SR layer 9 is formed with a predetermined screen.
[0015] Drawing 4 is property drawing showing the electric corrosion-proof nature of the printed circuit board by one example of this invention.
[0016] Thus, since the obtained printed circuit board did not have the residue of a catalyst in the bottom of the SR layer 9, as shown in drawing 4 , degradation of the insulation resistance between circuits was not accepted.
[0017] In addition, in formation of the plating-resist layer 4 of drawing 2 (c), the approach of laminating a plating-resist film, and contacting a predetermined mask film, and carrying out development clearance of the part for an unexposed part after exposure in ultraviolet rays, next carrying out chemistry copper plating can also be used.
[0018] Moreover, in formation of the SR layer 9 of drawing 3 (c), after applying SR ink by the curtain coating machine, the spray coater, electrostatic coating, a roll coater, etc. or laminating a dry film, it contacts, a predetermined mask film is exposed and how a developer removes a part for an unexposed part can be used.
[0019]
[Effect of the Invention] It is effective in the ability to prevent insulation resistance degradation by this invention, since there is no residue of a catalyst in the bottom of SR layer as explained above.
[0020] Moreover, in order to form SR layer on the resin substrate side roughened by homogeneity, it excels in the thin line adhesion force, and there is effectiveness whose high

density response is attained.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view shown in order of the process explaining one example of this invention.
[Drawing 2] It is the sectional view shown in order of the process explaining one example of this invention.
[Drawing 3] It is the sectional view shown in order of the process explaining one example of this invention.
[Drawing 4] It is property drawing showing the electric corrosion-proof nature of the printed circuit board by one example of this invention.
[Drawing 5] It is the sectional view shown in order of the process explaining an example of the manufacture approach of the conventional printed circuit board.
[Drawing 6] It is the sectional view shown in order of the process explaining an example of the manufacture approach of the conventional printed circuit board.
[Drawing 7] It is property drawing showing the electric corrosion-proof nature of a printed circuit board with an example of the manufacture approach of the conventional printed circuit board.
[Description of Notations]
1 Resin Substrate
2 Adhesives Layer
3 Through Hole
3a Breakthrough
4 Plating-Resist Layer
5 Chemistry Copper-Plating Layer
6 Copper Foil
7 Insoluble Anode
8 Circuit
9 SR Layer

[Translation done.]